

Excitement and Chemical Action

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oxide which is formed upon it by the heat employed in the process of breaking it up. Then two platinum wires, connected by a galvanometer, may be put into the acid, and one of them pressed against the piece of tin, yet without producing an electric current. If, whilst matters are in this position, the tin be scraped under the acid by a glass rod, or other non-conducting substance capable of breaking the surface, the acid acts on the metal newly exposed, and produces a current; but the action ceases in a moment or two from the formation of oxide of tin and an exhausted investing solution (906), and the current ceases with it. Each scratch upon the surface of the tin re-produces the series of phenomena.

1021. The case of iron in strong nitric acid, which acts and produces a current at the first moment (831, 939, 989), but is by that action deprived of so much of its activity, both chemical and electrical, is also a case in point.

1022. If lead and tin be associated in muriatic acid, the lead is positive at the first moment to the tin. The tin then becomes positive, and continues so. This change I attribute to the circumstance that the chloride of lead formed partly invests that metal, and prevents the continuance of the action there; but the chloride of tin, being far more soluble than that of lead, passes more readily into the solution; so that action goes on there, and the metal exhibits a permanent positive state.

1023. The effect of the investing fluid already referred to in the cases of tin (907) and cadmium (906), some of the results with two metals in hot and cold acid (954), and those cases where metal in a heated acid became negative to the same metal in cold acid (941, etc.), are of the same kind. The latter can be beautifully illustrated by two pieces of lead in dilute nitric acid: if left a short time, the needle stands nearly at 0°, but on heating either side, the metal there becomes negative 20° or more, and continues so as long as the heat is continued. On cooling that side and heating the other, that piece of lead which before was positive now becomes negative in turn, and so on for any number of times.

1024. *When the chemical action changes the current changes*

also.—This is shown by the cases of two pieces of the same active metal in the same fluid. Thus if two pieces of silver be associated in strong muriatic acid, first the one will be positive and then the other; and the changes in the direction of the current will not be slow as if by a gradual action, but exceedingly